Underground News

Geology and Well Technology Section

Providing Information to the Water Well, Underground Injection Control (UIC) & Underground Hydrocarbon Storage (UHS) Industries in Kansas and other Partners Interested in these Operations, the Environment, Water Resources and Energy

Fall 2017

Inside this Issue

Geology & Well Technology Fall 2017 Seminar/Tech Fair
By Mike Cochran, PG

The Geology and Well Technology Section conducted its 2017 Annual Technical Seminar in Wichita at the Sedgwick County Extension Education Center on August 28 and August 29. A variety of presentations were made by a number of experts; including an overview of current environmental issues by KDHE Director of Environment John Mitchell, an overview of Bureau of Water environmental issues by BOW director Jaime Gaggero, brine pond installation, cavern stability, pollution prevention, Class I disposal wells design and testing, natural gas porosity storage, safe water well design, salt solution mining, the impact of water resources on development of cities in Kansas, treatment and reuse of produced water, an overiew of the oil industry in Kansas, an update on injection induced seismicity, and KDHE program and EPA Underground Injection Control Program updates. There were 200+ participants. An added attraction to the seminar this year were vendor informational booths that seminar participants visited. A list of the vendors is as follows. We greatly appreciate their attendance and the information on services and equipment they were able to provide.

AEI Corp
Allied Environmental Consultants,
Baker Hughes
BakerCorp
Burns & McDonnell Engineering Co,
C.U.D.D.
Dale Hayse
Eli Wireline Services, LLC
Geoprobe Systems
GHD
GSI Engineering
Hydro Resources
KDHE
Layne Christensen Company
Lonquist Field Service
Lorentz US Corp
Petrotek Engineering Corporation
Prestige Waterline
SCS Engineers
SOCON Sonar Well Services, Inc.
Sonic Surveys, LTD
Strata
T&C MFG & Operating, Inc.
UCS, LLC
Valve & Wellhead Specialists LLC
Weatherford Wireline
Wolverine
WSP
Due to Hurricane Harvey impacting the Houston area, some vendors were unable to attend.

Many compliments were received by KDHE staff on the quality of the presenters and presentations and that the workshop and seminar were well organized. The Geology and Well Technology Section staff worked very hard and succeeded in providing useful information to its regulated community and those interested in the Section's programs, the environment, and energy and water resources. These seminars also provide an excellent networking event for the attendees. The seminar provided an opportunity to earn 12 professional development hours. (Continued on Page 2 and 3)

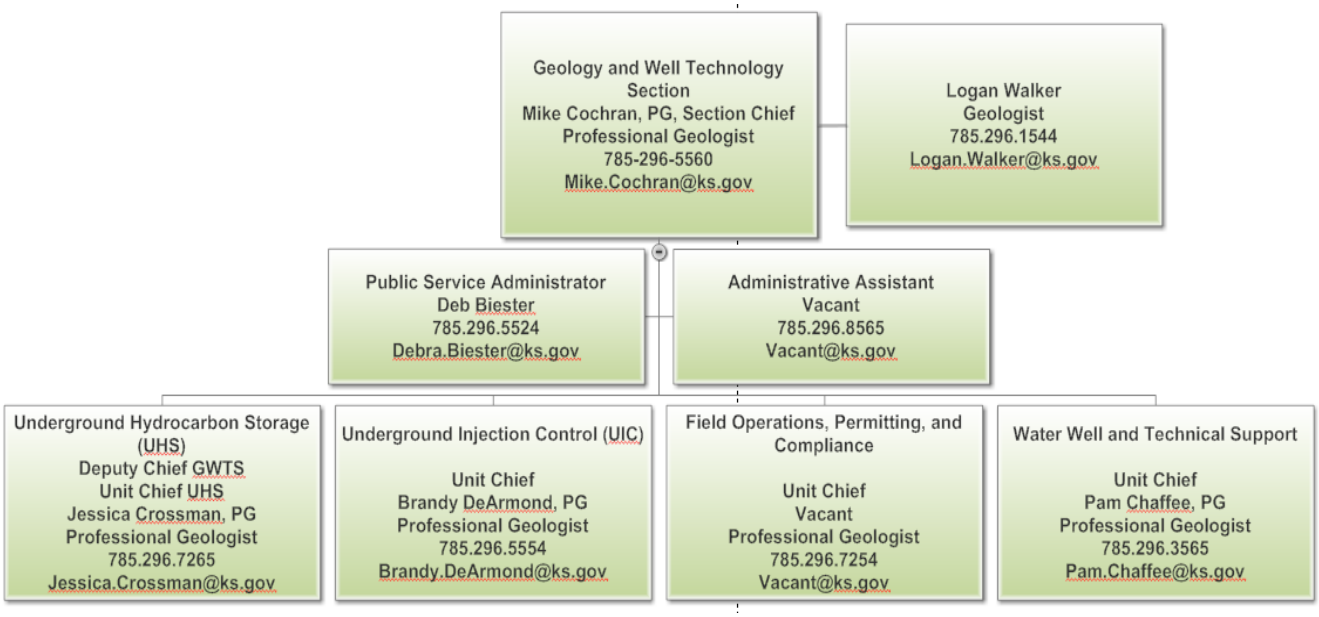
Seminar/Tech Fair Vendors

Seminar/Tech Fair Vendors

Some Speakers

Geology & Well Technology Staff 2017

by Deb Biester



Rachael Berg, who was our part-time Administrative Assistant, last day with GWTS was September 5, 2017. She was offered a job in the private sector.

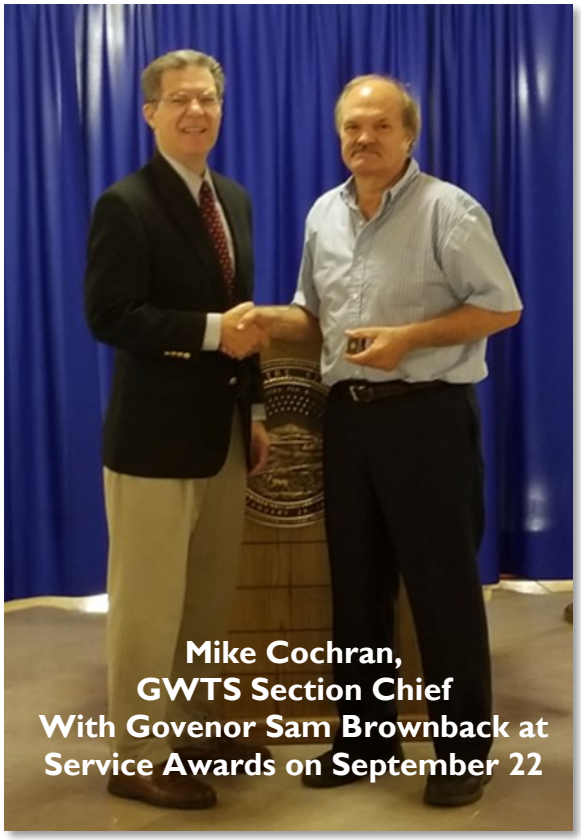
Doug Doubek, Unit Chief, Field Operations, Permitting and Compliance, retired from KDHE on October 20, 2017. Doug has dreams and wishes to fulfill.

GOOD LUCK TO THE BOTH OF THEM !!!

GWTS
Geology and Well Technology Section

40 Years of Service

by Mike Cochran, PG



Mike Cochran,
GWTS Section Chief
With Govenor Sam Brownback at
Service Awards on September 22

Forty years is a long time no matter how you cut it. As of now, I actually have worked for KDHE 41 years. I am a Kansas licensed Professional Geologist and have been since 1999. My license number is 34, so you can see I have been around for a while. Now, some background on myself. I received a B.S. in Geology from the University of Kansas, May 1976. I started with KDHE on January 2, 1976. My first task was working in the Water Well Program reviewing the water well WWC-5 record forms. In 1979 I was promoted and transferred to the KDHE southeast Kansas District Office located in Chanute. At that time KDHE spent a lot of its efforts working with the oilfield environmental aspects and sharing regulation of the oilfield operations with the Kansas Corporation Commission. This included inspecting leases, responding to brine and oil spills, addressing complaints about oilfield operations and reviewing Class II (oilfield) injection well applications. Other duties included evaluating landfill sites, working on remediation projects, and responding to spills other than oilfield, such as spills of chemicals resulting from truck accidents. In 1982 I transferred to the Kansas Corporation Commission Oil and Gas Division office in Wichita. I remained an employee of KDHE. I served as liaison between KDHE and KCC on environmental matters and assisted the KCC in enhancing its environmental protection program. In 1985 I transferred back to the KDHE Topeka Central Office to continue working with the oilfield environmental program. In July 1986 I became Chief of the newly formed Geology Unit within the Industrial Program Section. Then, as a result of the Hutchinson gas release incident in 2001, the Unit was elevated to Section status (Geology Section) within the Bureau of Water and I became Section Chief and still serve as Section Chief. The Section changed its name a few years back to the Geology and Well Technology Section. This section is responsible for the Underground Injection Control (UIC) (all classes except for Class II, Underground Hydrocarbon Salt Cavern Storage Well and Water Well Licensing, Water Well Construction and Abandonment Programs, legacy brine wells and provides hydrogeologic support to other Bureau of Water programs.

(continued on page 6)

40 Years of Service (continued)

I currently serve as KDHE's representative on the KCC Oil and Gas Advisory Committee and have served in the past as one of four state representatives on the EPA National Technical Workgroup and for a number of years as a board of directors member and Division V chair of the Ground Water Protection Council which is a national organization of state UIC program directors. I am also a member of the Kansas Geological Society.

What changes have I observed during my time with KDHE? One is that companies are much more environmentally conscious and aware. When I started there were few if any companies that had an environmental group or even an environmental oriented staff member. The facility manager usually handled the environmental aspects of the facility operation and hiring a consultant to assist with environmental matters was pretty much unheard of. Now, most companies have trained environmental staff on board and/or use highly qualified consultants. I have also observed that the public is very interested in the impact to the environment of facilities in their area. I have found that almost all of the time the facilities and companies we regulate are good to work with on addressing environmental issues or problems.

What is carbon capture and storage (CCS)?

by Mike Cochran, LG

CCS is the capture of CO_2 resulting from manmade sources and then the compression of the CO_2 into a supercritical fluid. This fluid is subsequently injected into a deep geologic formation for long term storage. A supercritical fluid has characteristics of both a liquid and a gas. For example, a supercritical fluid will expand to fill its container like a gas, but has a density like that of a liquid. The injection into a geologic formation eliminates the release of the CO_2 to the atmosphere. The important parameters to consider when determining a suitable geologic formation for carbon storage include: rock porosity, rock permeability, and the absence of faults or manmade vertical migration pathways. The geologic formation used for this purpose must contain no useable resources such as water. The formation must also be isolated from the environment by intervening layers of impermeable geologic formations. The storage formation should have a significant amount of porosity which are spaces (pore space) in the rock, for the injected CO_2 to occupy, sufficient permeability which connects the pore space and allows the injected CO_2 to move away from the injection well and out into the formation. There must be no geologic or manmade pathways for the CO_2 to escape vertically from the storage formation back into the environment.

I do leave you with a thought. Storage is defined as: the act or method of storing something for future use.

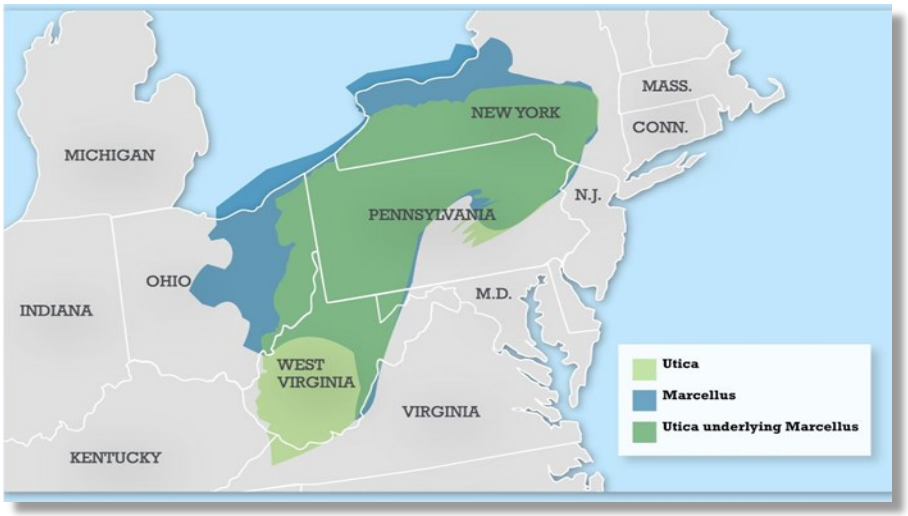
KDHE Presents at West Virginia Natural Gas Liquids Storage Workshop by Jessica Crossman, PG

The lead salt cavern storage regulators from Kansas and Texas traveled to Morgantown, West Virginia, in August to present to a group of regulators from West Virginia, Pennsylvania, and Ohio on the regulation of natural gas liquids (NGL) storage in salt caverns. The state officials in these three states are promoting a project to expand the market for ethane production from the liquids-rich Marcellus and Utica shale plays. Their vision is to link gas fields in these plays to end users in southern West Virginia and northeastern Kentucky via a "6-pack" of pipelines that essentially follows the Ohio and Kanawha rivers to petrochemical sites in northeastern Kentucky and southern West Virginia. This project will require the development of subsurface NGL storage and none of the states currently have adequate regulations for these type of facilities.

Jessica Crossman, Underground Hydrocarbon Storage Unit Chief at KDHE, presented to the group on how NGL storage works, what an NGL storage facility consists of, and what the regulatory requirements are in Kansas. Michael Sims with the Texas Railroad Commission then presented on what the regulatory requirements are in Texas. Following the presentations, there was an open discussion and question and answer session.

Many of the regulators were not familiar with NGLs or cavern storage. Brine storage and disposal was of great interest to the Appalachian regulators, especially those from Pennsylvania. They were concerned about potential contamination of groundwater related to brine storage and transfer. Kansas operators constantly struggle with difficulties associated with piping brine. Corrosion is much more prevalent in brine piping than product piping and the cleanup costs associated with a brine release can be significant. When groundwater is contaminated with brine, it is difficult to clean up and can take a very long time to be remediated. This is why the best approach to brine releases is prevention.

KDHE is working with the NGL operators in Kansas to try to eliminate these releases. While it may be impossible to completely eliminate brine spills, great strides have been made in that direction and the number and volume of brine spills has already reduced greatly since 2007, and should continue to decrease in the next few years.



Groundwater Protection Council 2017 Forum in Boston, Massachusetts
by Brandy DeArmond, PG

I recently had the privilege of attending the Groundwater Protection Council (GWPC) Annual Forum in Boston. Keynote speakers included Peter Grevatt, Director of the US EPA Office of Groundwater and Drinking Water, and Nancy Johnson, Senior Advisor with the Environmental Science and Policy Analysis Division, Department of Energy - Office of Oil and Natural Gas.

The 2017 Forum consisted of three days of presentations on topics within the following general categories: Underground Injection Control (UIC), Gas Storage, Oil & Gas, Produced Water, Source Water Protection, Green Infrastructure, Storm Water Management, Private Well Vulnerability and Assessment, Groundwater Protection, Brownfields, the National Groundwater Monitoring Network, Groundwater Infiltration, and Assessing Brackish Water Resources.

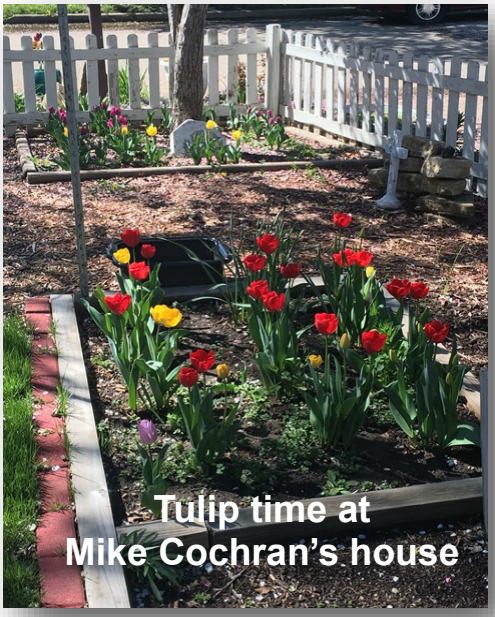
The GWPC is a nonprofit organization consisting of representatives of state regulatory agencies responsible for groundwater protection and underground injection activity who work together to protect the nation's groundwater. It is the only national association whose members regulate UIC wells.

I am a GWPC Class V Working Group Co-chair, and was a member of a panel discussion on how State UIC programs depend on other programs, within and outside of their agency, for field presence in order to recognize and report Class V wells. I used this opportunity to present to the group the ways in which the KDHE UIC Program accomplishes this, and to also acquire innovative ideas from other states.

I am also serving a two-year term on the GWPC Board of Directors. Board meetings are held twice a year; once during the Annual Forum and another during the spring. As part of my duties for the Board, I am the Class V liaison for the GWPC Class V Working Group to the Board. Being a board member allows contact with regulators in similar programs from different states, as well as the chance to collaborate as a group in commenting on national topics important to groundwater and UIC regulators.

Annually, GWPC hosts the Forum, held during the fall, which consists of a broad range of topics related to UIC and groundwater protection, and a UIC Conference, held during the winter that focuses specifically on issues related to all classes of UIC wells. The next UIC Conference will be held in Tulsa, Oklahoma from February 11-14, 2018.

GWTS Staff have outside hobbies . . . Remember these spring pics from the last newsletter?



Tulip time at Mike Cochran's house

Deb Biester working on a park like sitting area

Take a look at what transpired over the summer and into fall.

Colorful mums at Mike's

Biester loves her plants !!!

Plugging Abandoned Water Wells in Kansas

by Pamela Chaffee, PG

Unused or abandoned water wells that are not properly plugged can act as potential conduits for contamination to enter groundwater and can also pose a physical hazard to the safety of animals and people, particularly small children. While a large-diameter hand-dug well may be an obvious example of the latter, we learned from the Baby Jessica incident in October 1987 that an abandoned, unsecured well with a diameter as small as 8-inches can allow a toddler to fall into and become trapped.

Proper plugging of abandoned wells not only removes this physical hazard and the potential for contamination and waste of our precious groundwater resources, it also eliminates or reduces liability exposure for the landowner and protects and improves property values.

According to water well regulations in Article 30 (K.A.R. 28-30-2 et seq.), the Kansas Department of Health and Environment **(KDHE) may determine a water well to be "abandoned" if it meets at least one of the following conditions:**

- Use of the water well has been permanently discontinued;
- Pumping equipment has been permanently removed from the well;
- The water well either is in such disrepair that it cannot be used to supply water or has the potential for transmitting surface contaminants into the aquifer, or both;
- The water well poses potential health and safety hazards; or
- The water well is in such a condition that it is not an active well or cannot be placed in inactive status.

These conditions for determining whether a well is abandoned have been adopted as regulation or revised to provide stronger groundwater protections by local entities such as cities, counties, and groundwater management districts (GMDs). The Equus Beds GMD #2 regulations are more stringent and are included in Article 30.

Regulations also require that abandoned water wells, test holes, and boreholes be plugged or caused to be plugged by the well owner or landowner and that a plugging record (Form WWC-5P) be submitted to KDHE.

Depending on the condition of a well, the landowner may request permission from KDHE to maintain the well in an inactive status rather than plugging it.

Article 30 **regulations on proper plugging of abandoned water wells are based on whether the well formerly produced groundwater from an unconfined or confined aquifer, or both**. An unconfined aquifer contains groundwater at atmospheric pressure and the upper surface of the saturated zone of this aquifer is called the water table. A confined aquifer is where impermeable layers are above and below the aquifer and the groundwater it contains is under pressure greater than atmospheric pressure, causing it to rise in the well above the point where it was first encountered in the aquifer.

(continue page 11)

Plugging Abandoned Water Wells in Kansas—continued

Cased Wells – Unconfined Aquifer: Proper plugging of cased wells in an unconfined aquifer involve placement of chlorinated sand and/or gravel (or other approved material) from the bottom of the well to the static water level (or water table), followed by compacted clays or grout to a depth of six (6) feet below ground surface. From six (6) feet to three (3) feet below ground surface, a grout plug must be placed in the well and the casing cut off three (3) feet below ground surface and removed. From three (3) feet below to ground level, the plugged well must be covered with compacted soil.

Hand-Dug Wells: The lining material in these old, shallow wells must be removed to at least five (5) feet below ground surface. As with plugging a cased well in an unconfined aquifer, place chlorinated granular materials from the bottom of the well to the static water level, followed by compacted clays or grout to the depth where the lining material was removed, then seal the well with at least six (6) inches of concrete (or other approved material). From the concrete seal up to the ground surface, place compacted surface silts and clays (soil).

Left:

Hand-dug Well

Left:

Hand-dug Well

After being Plugged

Cased Wells – Confined Aquifer or both Confined and Unconfined Aquifers:

While more complicated than for an unconfined aquifer, the purpose of the regulations is to ensure that adequate and approved grout material is properly place with a grout tremie pipe in such a way as to either:

Fill the entire well column with grout;

Place 10-foot minimum grout plugs (a) opposite the impermeable formation or confining layer above each confined aquifer, (b) above and below the bottom of blank casing; and (c) below the top of the casing after removing 3-ft below ground, filling the space between plugs with silts, clays, sand, gravel, or grout; **OR**

For wells not grouted in the annulus when initially constructed (pre-1975), then in addition to plugging by method 1) or 2) above, remove or perforate the top 20-feet of casing prior to plugging the well and, if method 2) is used, place grout within the entire length of the screened or perforated interval(s).

Plugging requirements specific to abandoned wells or boreholes penetrating an aquifer with high mineral content (total dissolved solids), or in an area determined by KDHE to be contaminated, are also included in Article 30 regulations.

Article 30 regulations and additional information on plugging abandoned wells, cost-share funding for well plugging, and requirements for requesting and maintaining a well in inactive status is available on the KDHE Water Well Program website at:

http://www.kdheks.gov/waterwell/index.html or by contacting Pam Chaffee by phone at 785-296-3565 or by email at pam.chaffee@ks.gov.

Water Well Program—Upcoming Opportunities for CEUs
by Pam Chaffee, PG

There are a number of upcoming opportunities for Kansas Water Well Contractors to get training to meet their eight (8) continuing education units (CEUs) that are required to renew their license beginning with the first full year of licensure or the renewal period. CEUs must be processed through the Kansas Ground Water Association (KGWA). Information is available on the new KGWA website at https://kgwa.org/. Contact Dale Hayse, KGWA Executive Director, at Hayse Management Services, P.O. Box 107, Mullinville, KS, 67109, or at 620-548-2669, or at ksgroundwater@gmail.com.

- The annual **Governor's Conference on the Future of Water in Kansas** will be held November 8-9, 2017 at the Hilton Garden Inn & Conference Center in Manhattan, KS. Details are available at: http://kwo.ks.gov/news-events/governor's-water-conference.
- The **National Groundwater Association (NGWA) Groundwater Week** will be held Dec. 5-7, 2017, and the **NGWA Groundwater Summit** will be held Dec. 4-7, 2017. Both events will be held at the Music City Center in Nashville, TN. Details for each are available at: http://www.groundwaterweek.com/ and http://groundwatersummit.com/.
- The new location for the **70th Annual KGWA Convention & Trade Show** (Jan. 18-19, 2018) will be the Kansas Star Event Center located at 777 Kansas Star Drive, Mulvane, KS. Information is available from the above links for the KGWA website and email.
- The annual **KGWA Spring Seminar and Well Drilling Demonstration** will be held on Friday 27 April 2018 in Colby, Thomas County, KS, where rehabilitation of an irrigation well will be demonstrated and will include removal & reinstallation of the pump and installation of a new liner. Industry and agency topics will also be presented.
- **National Groundwater Association** (NGWA) regularly provides updates on upcoming groundwater events and education opportunities. Visit the following link on their website: http://www.ngwa.org/Events-Education/Pages/calendar.aspx.

Links to information on surrounding state groundwater conferences include:
Oklahoma: https://www.okgroundwater.org/ January 9-10, 2018;
Colorado: https://www.cgwa.co/events-1/ January 11-12. 2018;
Nebraska: http://www.nebraskawelldrillers.org/ February 13-15, 2018; and
Missouri: http://www.missouriwaterwellassociation.com/ February 19-21, 2018.

Water Well Testing

KDHE Certified Laboratories Listing can be found at the following website:

http://www.kdheks.gov/envlab/disclaimer.html

Kansas Department of Health and Environment

http://kdheks.gov

KDHE OFFICES WILL BE CLOSED ON THE FOLLOWING DAYS...

November 10 - Veterans Day

November 23 - Thanksgiving
November 24 - Thanksgiving

December 25 - Christmas

Web News

The following changes have recently been made to the Geology and Well Technology Section Web site:

Geology (http://kdheks/gov/geo)
- **Updated Index Page**
- **Updated Organizational Chart**
- **Added Seminar Presentations**

UHS (http://kdheks.gov/uhs)
- **Updated Index Page**
- **Added Seminar Announcement and Forms**

UIC (http://kdheks.gov/uic)
- **Updated Index Page**
- **Added Seminar Presentations**

Water Well (http://kdheks.gov/waterwell)
- **Updated Index Page**
- **Added Seminar Presentations**
- **Updated Active KS Water Well Contractor List**

E-mails were updated throughout all web docs.

Did You Know... ???

3,200 million gallons per day in Kansas of total groundwater withdrawal – American Geosciences Institute

- **37,939,556 barrels of crude oil were produced in Kansas in 2016 from 52,827 wells – Kansas Geological Survey**
- **245,109,024 mcf of natural gas were produced in Kansas in 2016 from 23,391 wells – Kansas Geological Survey**
- **Coal was likely first mined in Kansas from a hillside near Fort Leavenworth in northeastern Kansas as early as 1827, the year the fort was established – Kansas Geological Survey**

Don't get left behind…

Jump on the KOLAR Express

KANSAS ON-LINE AUTOMATED REPORTING
by Deb Biester and Pam Chafee, PG

In 2009, the Kansas Department of Health and Environment (KDHE), Bureau of Water, Geology Section and the Kansas Geological Survey (KGS) began discussing the use of KOLAR for submitting water well records by Kansas licensed water well contractors. Fifty-eight contractors were registered when the first water well record (WWC-5 Form) and fee payment were submitted via KOLAR on September 12, 2011. The first water well plugging record (WWC-5P Form) was submitted via KOLAR on June 24, 2014. As of October 16, 2017, ninety-two contractors have registered to use KOLAR.

Only Kansas licensed water well contractors can use KOLAR and they must be registered by KDHE. Instructions for registering are available on the Water Well Program website at: http://www.kdheks.gov/waterwell/index.html, at the link under KOLAR, under the heading **WWC-5/WWC-5P Forms**. The link http://kolar.kgs.ku.edu is used to start the registration process.

To submit a record for water well construction or reconstruction, select WWC-5 Form, or to submit a plugging record select WWC-5P Form. The location of the well must first be entered as latitude and longitude coordinates in decimal degrees, and the horizontal datum (WGS84, NAD83, or NAD27), must be selected for the source of the coordinates. KOLAR then automatically completes the portions of the record that report the location of the well (county, section, township, range, and four quarter fractions). Be sure the lat/long coordinates used are correct or the well will be incorrectly located.

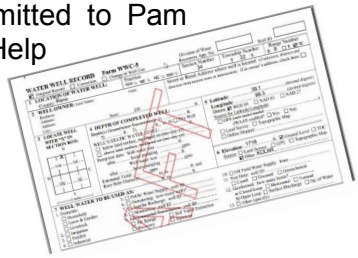
Once the location information is entered, then completion of the form can proceed and KOLAR provides guidance along the way. The user is warned when information is required to be entered, or is questionable or invalid. It also shows associated fields that must be completed based upon previously entered information about the well.

Any errors that would prevent submission of the form will be identified and the user can continue editing until the problems are resolved and submission can be completed. Form submission is quick and easy.

Well record reporting via KOLAR requires online payment by credit card. Payment fees are $7.00 for the first well construction record and $6.50 for each additional record when several are submitted together. Conventional filing of water well records requires $5.00 fee payment for each well construction record and expenses for mailing (postage and envelope). Remember - record fee payment is only required for new well construction. There is no charge for records reporting reconstruction or plugging of water wells.

Questions and requests for assistance in using KOLAR can be submitted to Pam Chaffee or Deb Biester at KDHE, or to the KGS KOLAR staff by using the Help tab.

SO ALL ABOARD…CLICK TODAY…
AND SIMPLFY YOUR LIFE



Instructions for registering to use KOLAR and how to use it are provided at:
http://www.kdheks.gov/waterwell/download/KOLAR_Instructions_by_Kurt_Look_KGS_1-19-2012.pdf-

Questions: Call Pam Chaffee at 785-296-3565 or Deb Biester at 785-296-5524

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UNDERGROUND NEWS

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Health and Environment**

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GWTS
Geology and Well Technology Section

MEMBER:

Ground Water Protection Council

Kansas Ground Water Association

national ground water association

Kansas
Department of Health and Environment

KDHE's Mission is to Protect and Improve the Health and Environment of all Kansans